DOCUMENT RESUME

ED 104 719 SE 019 006

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TITLE Metric Education Activities in State and Territorial Departments of Education - A Survey.
INSTITUTION ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.; Ohio State Univ., Columbus. Center for Science and Mathematics Education.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.; Pennsylvania State Univ., University Park. Coll. of Education.
PUB DATE Feb 75
NOTE 48p.
AVAILABLE FROM Ohio State University, Center for Science and Mathematics Education, 244 Arps Hall, Columbus, Ohio 43210 ($1.00)

EDRS PRICE MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS Budgets; Curriculum Development; Educational Change; Educational Legislation; *Educational Planning; Inservice Teacher Education; *Mathematics Education; *Metric System; National Surveys; Research; *State Departments of Education; *Surveys

ABSTRACT

By reviewing the literature on metric education, the authors identified eight major categories of concern: (1) national planning, (2) state planning, (3) budget needs, (4) curriculum development, (5) inservice training, (6) exemplary programs, (7) legislation, and (8) anticipated needs. A 16-item questionnaire to assess status with respect to these areas was developed and sent to state supervisors of science and mathematics. Responses were received from 46 states, the District of Columbia, and 4 territories. Data were analyzed and used to estimate the extent to which states were able to meet four objectives: comprehensive planning, effort for legislation, provision of curricular materials and inservice training, and budgetary support. It was concluded that states exhibited these abilities only slightly. The authors recommend that objectives for full metric education be developed, and that communication channels among states be established to aid in the development of materials. They also advise that metric consultants be identified, that efforts to pass legislation be intensified and that the approach to metric education be an interdisciplinary one. The questionnaire used and data collected are appended to this report. (SD)

ED104719

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MATHEMATICS EDUCATION REPORTS

by

Michael Szabo
Cecil R. Trueblood
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College of Education
The Pennsylvania State University

Metric Education Activities in State and Territorial Departments of Education - A Survey

ERIC Information Analysis Center for
Science, Mathematics and Environmental Education
400 Lincoln Tower
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Columbus, Ohio 43210

February 1975

Mathematics Education Reports

Mathematics Education Reports are being developed to disseminate information concerning mathematics education documents analyzed at the ERIC Information Analysis Center for Science, Mathematics, and Environmental Education. These reports fall into three broad categories. Research reviews summarize and analyze recent research in specific areas of mathematics education. Resource guides identify and analyze materials and references for use by mathematics teachers at all levels. Special bibliographies announce the availability of documents and review the literature in selected interest areas of mathematics education. Reports in each of these categories may also be targeted for specific sub-populations of the mathematics education community. Priorities for the development of future Mathematics Education Reports are established by the advisory board of the Center, in cooperation with the National Council of Teachers of Mathematics, the Special Interest Group for Research in Mathematics Education, the Conference Board of the Mathematical Sciences, and other professional groups in mathematics education. Individual comments on past Reports and suggestions for future Reports are always welcomed by the editors.

Foreword

Metric education has been a topic of some concern during the past two or three years. Teachers have shown their interest by their attendance at sessions on the topic at local, state, and national meetings. The failure of legislative action at the federal level to make the metric system the measurement system to be used has given a degree of hesitancy to developing programs of metric education. Yet it is widely agreed that the probability of the United States "going metric" is great, and, moreover, that metrication must be carefully coordinated.

The survey which Szabo, Trueblood, and Shockley report is an attempt to assess the current (mid-1974) status of metric education efforts (and beliefs) at the State Education Department level. Their questionnaire reflects concern in eight categories, and the data are discussed realistically. They plan to conduct follow-up surveys at intervals, to monitor the status of planning coordination efforts across the country. This first report provides educators with specific information to document the current status of metric education activities at the state level.

The study was conducted with funds from the College of Education at The Pennsylvania State University. The ERIC Center for Science, Mathematics, and Environmental Education is pleased to make it available to the educational community.

Marilyn N. Suydam
Editor

This publication was prepared pursuant to a contract with the National Institute of Education, U. S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official National Institute of Education position or policy.

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Metric Is Coming

What do Great Britain, Canada, France, Australia, Japan, and other major industrialized nations have in common that is not possessed by the United States? The metric system. Or, to be more precise, all except the United States have (more or less) a unified and coordinated plan to convert to the metric system by a specified date, if they are not now using it.

Although Benjamin Franklin, George Washington, and other national leaders supported the change to the metric system, the nation's legislative body has failed to pass similar legislation. The most notable instance occurred in 1974 when the House of Representatives floor legislation was defeated, primarily by powerful lobbying from union groups. During the summer of 1974, the landmark ESEA legislation containing the Special Projects Act, which would have provided ten million dollars per year for three years for metric education, was not funded.

In spite of this balking at the national leadership level, admittedly in a time of monumental government and fiscal crisis, the United States seems to be forging ahead in metric conversion. Ford, General Motors, International Business Machines, and a host of other industries have begun conversion to the metric system. It thus appears that "metric is coming" and it will affect all Americans to some extent.

It has been said that the biggest burden for metric conversion will fall on the public and vocational schools. Australia's approach to metrication was primarily educational. Given that one of the vocational skills soon to be required of the graduates of our schools is the ability to deal competently with the metric system of weights and measures,

it seems reasonable to assess the present status of metric education at the state level.

In the absence of federally encouraged metric changeover and with the pressure from industry beginning to mount, what are states doing in the area of metric education? Are the efforts coordinated or duplicative? What groups are doing what? What resources are needed to develop and carry out the plans?

Purpose of the Survey

In the middle of 1974, a survey of all State Departments of Education was conducted to determine the status of metric education activities in each of the states and territories of the United States. Specifically, an assessment was made of the plans, developments, goals, and projected metrication needs of State Supervisors of Science and Mathematics for preparing the public school population for a life with the metric system of weights and measures.

The survey was also designed to provide baseline data to study the process of educational change, which, according to eminent educators such as Benjamin Bloom, requires 50 years to become widely accepted educational practice.

Survey Methodology

During the Spring of 1974, a comprehensive literature search on the metric system in the United States was conducted. The ideas for the present survey developed from this effort. The topics of interest

were collected and the draft of a questionnaire was outlined. After a considerable amount of revision, a 16-item questionnaire was finalized.

The survey questionnaire is found in Appendix A. The questionnaire encompasses seven major categories.

Category	Name	Questionnaire Items
1	National Planning	7,15
2	State Planning	1,2,3,4
3	Budget Needs	8
4	Curriculum Development for Pupils	6,10,11
5	Inservice Training for Teachers	9,12,13,16
6	Exemplary Programs	14
7	Legislation	5
8	Anticipated Needs	6,8

The Council of State Science Supervisors is an organization of science educators employed in State Departments of Education. The Executive Council of this group sanctioned the survey; and the questionnaire was sent to members in each of the states, the Canal Zone, Guam, Puerto Rico, and the Virgin Islands. The survey was also sent to the chief mathematics educator in each of the states and territories.

Responses from 46 states, the District of Columbia, and four territories were received. To simplify reporting, a numerical code was assigned to each state and territory. The list of responding states and numerical codes is contained in Appendix B.

In some cases, both the mathematics and science supervisor for a given state completed and returned separate questionnaires. In other states, only one questionnaire was returned because the mathematics and

science supervisor are one in the same person. In the remaining cases, persons not allied with science or mathematics completed the survey. Responses were returned by mail and analyzed by The Pennsylvania State University Departments of Mathematics and Science Education.

The responses to the questionnaire are presented in Tables 1 - 7 (Appendix C). Each table presents responses within a specific category listed above (Table 1 contains responses to Category 1, National Planning, etc.). Category 8 draws upon Tables 3 and 4; thus no Table 8 is present in this report.

From left to right the columns in Tables 1 - 7 represent: 1) the specific item number, 2) the specific response options for that item (usually 5), 3) the responses from science supervisors (S), 4) the responses from mathematics supervisors (M), the responses from mathematics and science supervisors (M/S), the responses from non-mathematics or science persons (NM/S), and the item summary for all categories for that item.

The responses are identified by the state code number (Appendix B). For example, in Table 1, item 7, the mathematics supervisor of Georgia (number 12) chose option A. This is represented by the presence of the code number 12 in the Mathematics column and the row which designates item 7, response A. The number (N) selecting a given response option is also provided to aid in interpreting the meaning of the percentages presented in the following synopsis of the findings of the survey.

Findings

Planning, National, Category 1.

Table 1 lists the responses to items 7 and 15. The majority of respondents indicated a willingness to serve on a metric planning board. Only two state respondents (S) see no need; one (M) already serves; and the majority (67%) would be willing to serve. The percentage of S and M responses to an affirmative answer was approximately equal (14 of 21 and 21 of 30, respectively), indicating equivalent interest in national planning for metric education by S and M education specialists.

Twenty-seven percent indicated they now serve on some metric conversion board and 73% responded in the negative to item 15. No person classified as NM/S presently serves. The discrepancy between responses to items 7A and 15A suggests there are memberships on metric conversion boards on other than national or regional basis (e.g. state, local, informal, ad hoc, etc.). Although the metric conversion will ultimately affect all facets of life, NM/S education specialists are not now represented on any metric boards.

The level of interest is high but apparently those doing national planning have not yet chosen to involve State Departments of Public Education (DPE). If federal funds are to be allocated to states through DPE's it would seem judicious for the national planning groups to capitalize on the interest evidenced by the response to these questions.

Planning, State, Category 2.

Items 1-4 (Table 2) examine issues related to state planning for metric education. In response to the question of start-up dates for

Departmental metric coversion (item 1), 23% hadn't begun as of July, 1974. The majority (66%) began between 1972 and the present. Only a handful (11%) began prior to 1972: three state S specialists and three state M specialists.

The vast majority (92%) indicated full metric conversion in schools by 1978 or later (item 2). Coupled with responses to item 1B, the data suggest a minimum of six years for full metric conversion. There is a good deal of variability by state. State 12 (S), for example, began formal planning between 1972 and mid-1974 and expects full conversion by 1975. State 47 (S), on the other hand, began planning before 1968 and doesn't expect full conversion until after 1977.

Item three deals with manpower allocation for metric education. Sixty-five percent of the states have no one employed for this purpose. One person, less than full time, is employed by 28% of the respondents. Three S, eight M, four M/S , and two NM/S respondents comprise this 28%. Only four states have one full-time equivalent (or more) person in metric changeover; three are M specialists, one is a NM/S specialist.

Respondents were directed to choose all options which apply to item 4. As a result, the percentage figures in the columns do not add to 100%. Few respondents indicated no needs for consultant services. The least anticipated need for all S, M, M/S, and NM/S respondents was in the area of industrial/education cooperatives. The need for Public School, Teacher Training, and Adult Education consultants was rather uniformly spread across the four classifications of respondents.

Budget Needs, Category 3.

Item eight (Table 3) requested estimates of budget needs to mount K-adult conversions starting from zero programs. Sixty-one percent of the respondents indicated an estimated cost of $400,000 or less; 21% estimated between $400,000 and $800,000. Only 19% estimated $800,000 or more.

Budget responses, when examined in the light of other responses, present a study in variation. For example, State 11 has not yet begun formal planning, estimates full conversion after 1977, has no one employed for metric changeover in the Department of Public Education, needs consultant help in the four areas outlined in item 4, and projects a budget of $1,600,000 to $2,000,000. On the other hand, State 52 has begun planning, expects completion after 1977, has no metric employee, needs consultant help in all four areas, and estimates a budget of $400,000 or less.

Budget estimates do not appear related to the geographical size of given states.

Curriculum Development for Pupils, Category 4.

Items six, ten, and eleven (Table 4) focus on metric curriculum developmental efforts for pupils.

The majority of respondents of all classifications felt metric education should begin in grades K-6. Fewer felt it should begin in K-9. The responses for grades 10-12, post-secondary or adult, or industrial were varied across the four classes of respondents.

Since respondents were directed to mark all appropriate choices for item six, it is possible to conclude that the respondents wish to begin with more than one level simultaneously.

Fifty-three percent of the respondents have no developmental efforts for student learning of the metric system (item 10). Twenty-one percent are developing curriculum materials, including 4 S, 8 M, and 1 NM/S respondents.

Item eleven was to be answered by only those who responded "Yes" to item ten, and all appropriate choices were to be indicated. Some (N=5) respondents were apparently confused by the directions, as they indicated no curriculum materials developed for pupils in item 10 but proceeded to answer question 11. Closer inspection reveals that it is reasonable to expect those who responded "No" to question 10 not to answer question 11. Only 5 responding "No" to question number 10 responded to question number 11; these responses were omitted since they were uninterpretable.

The general pattern of responses to question 11 suggests a somewhat even distribution across the five response options with a bit more emphasis on B (upper elementary) and C (middle or junior high school). State Departments seem to be slightly better prepared at the upper elementary and junior high school levels with available curriculum materials.

Inservice Training for Teachers, Category 5.

Four questions (9, 12, 13, and 16) were aimed at assessing the levels of teacher-training activities in the Departments. Two of the questions were forced-choice and the other two (13 and 16) requested that all appropriate options be checked. These data are summarized in Table 5.

Question nine sought to determine the availability of instructional programs or curricula for the express purpose of training teachers to teach the metric system. One-half of the science respondents and one-third

of the math respondents answered in the negative, while two thirds of the M/S respondents indicated yes. Apparently, those charged with dual M/S responsibilities clearly see inservice training for metric education as falling directly under their subject-matter jurisdiction.

Four state NM/S respondents have materials or curricula in planning or developmental stages. The corresponding figure for M/S is 2; for M the figure is 18; and for S it is 7.

Responses to question number 12 indicate that less than half (44%) of the respondents have no instructional programs or curricula for training teachers to learn the metric system. Across all categories some 22% and 23%, respectively, indicated such materials were being planned or developed.

The same error in the following directions for questions 10-11 was made for questions 12-13, thus raising questions about the response accuracy. There is generally a uniform response to options A-E of question 13, suggesting that in M and S areas, at least, those teacher-oriented learning materials are being produced for all grade classification, with slight emphasis on the elementary and middle school. M/S respondents are clearly emphasizing the elementary level teachers over junior and senior high teachers.

Training adults does not seem to be a substantial concern to Departments of Public Education. This probably stems from the nature of the domain of authority vested in the Departments.

Question 16 asked which categories of teacher training institutions presently have programs to train teachers to teach the metric system. Across all respondents, 40% and 43% indicated such programs in existence at State Colleges and State Universities, respectively. Twenty-eight percent and 27%, respectively, have training programs in private colleges or county or regional educational units.

A comparison of the apparent availability of metric training programs for teachers at post-secondary levels may explain why such a high percentage of states have no materials or curricula to train teachers to understand or teach the metric system. The burden is with the higher institutions of learning. A degree of cooperation and coordination between Departments of Education and teacher training organizations is called for in those states where materials and curricula are being developed.

Exemplary Programs, Category 6

Table 6 summarizes the responses to question number 14 on the awareness of exemplary metric programs within the states.

Over 50% of the respondents were not aware of any such programs. Another 18% stated there were none, and 29% indicated there are such programs. Logically, the M, S, and M/S respondents were aware of these programs. Interestingly, two NM/S respondents were aware of programs in their states.

Legislation, Category 7

Table 7 shows the status of conversion legislation and resolutions in the states and territories (item 5). Seventy-two percent of the respondents report no legislation action was taking place as of June, 1974. Twenty percent report legislation pending. Six percent report that their state had passed a bill regarding metric conversion and two percent reported that some funds had been appropriated. These data would seem to indicate that the majority of the state and territorial legislative bodies have not felt the need to pass legislation or funds to support and motivate metric conversion in their state.

During late summer of 1974, the Pennsylvania State Board of Education passed a metric education resolution. It is possible that other states who reported 'legislation pending' may have experienced passage by the present time.

Anticipated Needs, Category 8

Table 4 (item six) and Table 3 (item eight) together give some indication of the needs anticipated by Departments of Public Education to support their curriculum development effort. The budget amounts cited by 61 percent of the states ($400,000) would seem to be unrealistic when compared to the fact that they also believe that curriculum development efforts in metrication should begin at all levels simultaneously.

Related Findings

A survey of metric education in the States was conducted by Derion (1972). This survey form was sent to the chief education officer of each state. Ninety percent (45) responded. The results provide some basis for determining trends or changes occurring in the field of metric education. Five general conclusions seem warranted by Derion's data.

First, it was reported that the majority of states were just beginning to visibly support metric education. Many states had charged a particular individual to coordinate metric activities and more than 33 percent reported a metric committee with an assigned specialist.

Second, only three states had passed mandated legislation or resolutions regarding the metric system. In addition, two states had legislative action pending.

Third, the chief activity of State Departments of Pubiic Education was limited to the distribution of resource materials, bibliographies, information bulletins, etc.

Fourth, no state reported the use of any metric curriculum guides. Three respondents indicated they had at least one curriculum guide under development; one described a pilot program at the local school level.

Finally, very few reported the development or initiation of substantial teacher training workshops. Two states were exploring teacher training through broadcast instructional television.

It seems clear that there was little or no impetus for extensive developmental work in metric education at the state level in 1972 in most Departments of Education (Derion, 1974). There was little evidence that state offices were implementing the philosophy of other national conversion efforts, namely that the changeover should be planned and co-ordinated to achieve changeover by a specified target date.

Another survey of state metric education activity was completed in July of 1974 by the Metric Information Office of the National Bureau of Standards, Washington D.C. In brief, this survey found that: 1) some 19 states had completed some type of formal action by legislatures or state school boards, and 2) 43 had some other type of formal state-level activity underway.

A survey of teacher inservice training programs is presently in progress under the auspices of the American Institutes for Research of Palo Alto, California. The Institutes have also completed a study of international metrication entitled "Going Metric: An Analysis of

Experiences in Five Nations and Their Implications for U.S. Educational Planning."

Conclusions and Discussion

To assist in interpreting the results of this survey it is desirable to compare the present results with a set of evaluative criteria designed to highlight the extent to which the various Departments of Education have become part of the national metrication movement and are progressing toward playing an active part in the metrication of their state's school systems. These criteria are characteristics that describe what the authors believe would be a reasonable expectation if a rational course of action was being pursued to bring about the metrication of a state's school curriculum structure. Each criterion is presented below followed by a general rating and related discussion based upon the data collected by the survey.

PLANNING FOR METRICATION SHOULD BE COMPREHENSIVE AND CAREFULLY COORDINATED AT THE STATE AND NATIONAL LEVEL

TO WHAT EXTENT HAVE THE STATES EXHIBITED THIS CHARACTERISTIC?

Not at all Slightly Moderately Extensively Completely

From this survey it is apparent that the State Department of Education respondents are quite willing to serve on metric conversion boards. However, very few are presently serving. Apparently this potential source for planning and coordination is just beginning to develop and has not been tapped at the national level.

At the state level it is clear that most states anticipate completing metrication in the schools in 1978 or later. Considering the projected

manpower allocations (2/3 of the states have employed no one for the purpose of metric education) now available for planning and coordination at the state level, it is not unreasonable to expect metrication in most schools to occur after 1978 rather than before this date. It seems clear that a comprehensive and carefully coordinated metrication movement is yet to be realized at the state or national level.

A FIRM NATIONAL AND STATE COMMITMENT SHOULD CONSIST OF SUPPORTING LEGISLATION AND APPROPRIATION MEASURES, INCLUDING ESTABLISHMENT OF A DEFINITE TARGET DATE FOR FULL CONVERSION TO THE METRIC SYSTEM

TO WHAT EXTENT HAVE THE STATES EXHIBITED THIS CHARACTERISTIC?

Not at all Slightly Moderately [illegible] Completely

Without federal legislation and appropriation measures, only 14 states or territories have legislation passed or pending. Apparently the state and territorial legislatures have not seen the need to pass supporting legislation or to appropriate funds. Without this type of incentive it is doubtful that State Departments of Education can afford to appoint personnel to plan, coordinate, or develop curriculum guidelines or perform other needed metrication actions. This statement seems to be supported by the data collected on State and National Planning and the lack of personnel committed to implementing state metrication efforts.

STATE DEPARTMENTS OF EDUCATION SHOULD BE PREPARED TO PROVIDE SCHOOL DISTRICTS WITH CURRICULUM GUIDELINES, MATERIALS FOR STUDENTS, AND INSERVICE TEACHER EDUCATION

TO WHAT EXTENT HAVE THE STATES EXHIBITED THIS CAPABILITY?

Not at all Slightly Moderately Extensively Completely

State Departments of Education efforts thus far seem to be concentrated in the vital areas of development of curriculum materials for pupils.

However, roughly 50% of the respondents indicated no efforts in this area. Those who reported curriculum development efforts are beginning in the early grade levels. However, they believe that they should also begin with the Junior and Senior High School levels simultaneously.

In another crucial area, teacher training materials, State Departments of Education have just begun to respond to the need for quality materials for training teachers how to teach the metric system. Forty-four percent have no instructional program or curriculum materials. For those producing programs and materials, there is an attempt to help teachers at all grade levels.

Apparently there has been a minimum amount of effort in over half of the states to meet the needs of pupils and teachers. This is probably related to the small amount or lack of funds earmarked by legislatures for metrication.

STATE DEPARTMENTS OF EDUCATION SHOULD ANTICIPATE NEEDED BUDGET AND OTHER RESOURCES TO OBTAIN CONSULTANT HELP, AND SUPPORT CURRICULUM DEVELOPMENT SERVICES AND OTHER REQUIREMENTS NEEDED TO CARRY OUT A STATEWIDE METRICATION PROGRAM

TO WHAT EXTENT DID THE STATES MAKE BUDGET ESTIMATES CONGRUENT WITH NEEDS CITED?

Not at all Slightly Moderately Extensively Completely

There was considerable variability across states in terms of the length of time estimated and the amount of money projected for full metric conversion. The variability is undoubtedly related to the fact that this survey did not prompt respondents to undertake a comprehensive budget planning session. It would seem that the respondents held widely disparate and sometimes indefinite views regarding what funds would be required for complete metric conversion. For example, many representatives

indicated that metrication should begin at all levels simultaneously, had no one employed for metric changeover in the Department of Education, needed consultant help, had developed no inservice teacher education plan, and said that a budget of $400,000 or less would be required.

Recommendations

This survey has generated a series of recommendations and implications which are cited below. It should be noted that some of the recommendations are more strongly supported by the survey than others.

First, it appears that different respondents hold widely different conceptions of the meaning of full metric education. Just as instructional objectives aid the classroom teacher in knowing where his instruction is leading (and when he has arrived), full metric education goals and objectives must be identified. A major subcomponent of this activity will undoubtedly be the identification of minimal metric competencies for teachers and students. Identification of metric competencies will be entirely consistent with present movements to establish competency-based educational criteria.

The second recommendation is the establishment of inter- and intra-state communication structures to coordinate the development of metric competencies, curriculum materials, inservice training programs, and budgetary planning. These actions require the establishment of positions charged with the responsibility for metric program development.

The strong need for metric consultants suggests the third recommendation: the development of a cadre of trained teams, geographically dispersed,

which can provide quality aid to school districts and other educational agencies in need of assistance. The involvement of national curriculum boards is seen as highly advantageous here.

The fourth recommendation is predicated on the assumption that centralized impetus will add coordination and purpose to the present haphazard groping toward metric conversion. A concentrated thrust for federal legislation which mandates a conversion date and establishes a coordinated set of broad guidelines should be supported.

Finally, metric education should be treated as an interdisciplinary movement for two basic reasons. First, the metric impact will affect the factory worker and the homemaker as well as the ordinary consumer. Second, associating the learning of the metric system with mathematics or science alone will leave the science and mathematics "shy" student with a lack of understanding of and concern for the metric system.

Capstone

It would appear that the states are just beginning to respond to one of the largest curriculum and social changes in the last 50 years. They are just beginning to support educational efforts aimed at full conversion to the metric system. These efforts may be just the beginning of a powerful groundswell movement; or they may be a modest and temporary response to the federal metric conversion, education legislation, and the lure of federal monies which have culminated in neither a substantial conversion effort nor related state and federal appropriations. One would hope the next survey will show substantial progress toward more participation by State Departments of Education in full metrication programs.

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APPENDIX A

THE PENNSYLVANIA STATE UNIVERSITY
CHAMBERS BUILDING
UNIVERSITY PARK, PENNSYLVANIA 16802

College of Education
Division of Academic
Curriculum and Instruction

June 3, 1974

Dear Sir:

We are presently conducting a multi-faceted investigation of the status of metric education programs in the United States. One important component of our work concerns the extent to which various States are preparing for metric changeover. A set of questions on this topic has been carefully formulated into a brief questionnaire which should provide this information.

A copy of this questionnaire has been sent to you as a Science or Mathematics Education Advisor in your respective State. We would greatly appreciate if you would complete this form to the best of your knowledge and return the answer sheet via the enclosed envelope. In return, we will be pleased to provide you with a written summary of our findings for your use in planning activities.

Your prompt response is appreciated. If specific dates help you plan your work, let us suggest that you mail the completed forms back by June 20, 1974. Your time and consideration is appreciated.

Sincerely,

Michael Szabo
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Enclosures

Metric Education Questionnaire

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General Directions

1. Mark your answers on the green (Penn State University) answer sheet, using pencil only.

2. Provide the following information on the reverse side of the answer sheet:

   I. Name
   II. Position
   III. Business Address and Phone Number
   IV. Chief Responsibilities

3. Answer all questions on the answer sheet by darkening the letter (A, B, C, D, or E) or letters of your choice.

4. Return the green answer sheet via the enclosed envelope by, if possible, June 20, 1974.

For responses to items 1-8 darken in the space provided on the answer sheet that corresponds to the most appropriate response (A-E).

1. When did your Department or Division begin formal planning for conversion to the metric system?

   A. Haven't begun yet
   B. 1972 - Present
   C. 1970 - 1971
   D. 1968 - 1969
   E. Before 1968

2. When do you anticipate full metric conversion in your State's elementary and secondary schools?

   A. Now
   B. 1975
   C. 1976
   D. 1977
   E. 1978 or later

3. Approximately how many people are employed for the purposes of metric changeover in your State Department of Education?

   A. 1 person (equivalents), more than full time
   B. 1 person (equivalents), full time
   C. 1 person (equivalents), less than full time
   D. No one explicitly employed for this purpose

4. What needs for consultant services to serve schools in your State do you anticipate? (Darken all choices which apply.)

   A. Public school
   B. Teacher training
   C. Adult Education
   D. Industry/education cooperatives
   E. None

5. What is the status of legislation in your State regulating or guiding metric conversion?

   A. Metric conversion funding passed
   B. Metric conversion bill passed
   C. Metric conversion legislation pending
   D. No legislative action taking place

6. In your opinion, at which level(s) should public education of the metric system begin? (Darken all choices which apply.)

   A. K-6
   B. 7-9
   C. 10-12
   D. Post secondary or adult
   E. Industrial (business and industry)

7. Would you or someone associated with your metric changeover be willing to serve as a consultant on a nationwide or regional conversion board?

   A. I already do
   B. Yes
   C. No
   D. I would like more information before deciding
   E. I see no need for such a board

8. What size budget would your Department or Division need to mount a teacher training/curriculum development effort to effect metric conversion in grades K-adult? (Assume starting from zero programs.)

   A. $1,600,000 - 2,000,000
   B. $1,200,000 - 1,600,000
   C. $800,000 - 1,200,000
   D. $400,000 - 800,000
   E. $0 - 400,000

For responses to items 9-17 additional information may be requested that cannot be provided in answers A-E on the answer sheet. Please list additional information on the reverse side of your answer sheet.

9. Does your State Department of Education have instructional programs or curricula for training teachers to teach the metric system?

   A. Yes
   B. No
   C. In planning stage
   D. In development stage

If yes, could you send us a copy or tell us how we can obtain one?

10. Does your State Department of Education have completed or under development curriculum materials or guides regarding learning of the metric system by students?

A. Yes
B. No
C. In planning stage
D. In development stage

If yes, could you send us a copy or tell us how we can obtain one?

If you answered question 10 with a yes, please answer question 11. Otherwise, skip to question 12.

11. For which levels (in question 10) are student oriented curriculum materials available? (More than one answer may be darkened, if appropriate.)

A. Early Childhood (N-3)
B. Upper Elementary (4-6)
C. Middle or junior high (7-9)
D. Secondary (10-12)
E. Adult

12. Does your State Department of Education have instructional programs or curricula for training teachers to learn the metric system?

A. Yes
B. No
C. In planning stage
D. In development stage

If yes, could you send us a copy or tell us how we may obtain one?

13. If you answered question 12 with a yes, please indicate the area(s). Otherwise skip question 13 and proceed to question 14. (More than one answer may be darkened, if appropriate.)

A. Early Childhood
B. Upper elementary
C. Middle or junior high
D. Senior high
E. Adult

14. Are there other additional exemplary programs presently operating in your State? (e.g., in public or private schools?)

A. Yes
B. No
C. I am not aware of any

If yes, please explain briefly on the reverse side of this answer sheet, what types of programs (public school, teacher training, adult education, industry, other). Please provide name and addresses of project directors, if available.

15. Do you now serve on any metric conversion board?

A. Yes
B. No

If yes, please explain your position and title on the reverse side of the answer sheet.

16. Which teacher training institutions in your State currently have programs to train teachers to teach the metric system? (More than one answer may be darkened, if appropriate.)

A. State colleges
B. State universities
C. Private colleges or universities
D. County or regional education units
E. Industrial/private consultant supported

Please list names and addresses of project directors, if available, on the reverse side of your answer sheet.

17. Would you like to receive a summary of the findings of this survey for use in your own planning activities? (Please check the accuracy of your name, address and phone number on the reverse side of the answer sheet.)

A. Yes
B. No

Thank you for your kind assistance. Please return the answer sheet (only) in the envelope provided. Place it in the mail by June 20, if possible.

APPENDIX B

Numerical Coding For States and Territories

Numerical Code	State or Territory	Numerical Code	State or Territory
1	Alabama	31	Nevada
2	Alaska *	32	New Hampshire
3	Arizona *	33	New Jersey *
4	Arkansas	34	New Mexico (No Response)
5	California	35	New York
6	Canal Zone	36	North Carolina
7	Colorado	37	North Dakota
8	Connecticut *	38	Ohio (No Response)
9	Delaware	39	Oklahoma
10	District of Columbia	40	Oregon
11	Florida *	41	Pennsylvania
12	Georgia *	42	Puerto Rico
13	Guam	43	Rhode Island (No Response)
14	Hawaii	44	South Carolina
15	Idaho	45	South Dakota *
16	Illinois	46	Tennessee *
17	Indiana *	47	Texas *
18	Iowa *	48	Utah
19	Kansas	49	Vermont
20	Kentucky	50	Virgin Islands
21	Louisiana	51	Virginia *
22	Maine	52	Washington
23	Maryland	53	West Virginia
24	Massachusetts	54	Wisconsin *
25	Michigan	55	Wyoming
26	Minnesota		
27	Mississippi		
28	Missouri		
29	Montana (No Response)		
30	Nebraska *		

* States Giving Dual Response

APPENDIX C

TABLES 1 - 7

Table 1 Response Patterns to National Planning Category (Items 7, 15)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 7	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	0		1	12	0		0		1	2
B	14	2,3,7,8,10,11, 18,17,27,30,33, 51,49,54	20	5,8,11,13,16,20, 21,23,25,26,36, 30,33,35,40,46, 47,51,54,53,4	5	9,14,15,41,55	4	2,3,28,45	43	67
C	0		1	4	0		0		1	2
D	5	19,42,46,47,52	8	1,18,17,32,31, 39,44,22	1	37	3	24,6,44	17	26
E	2	12,48	0		0		0		2	3
Totals	21		30		6		7		64	--
Omits	0		0		0		1		1	--

Table 1 (Continued)

Item # 15	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
	N	States	N	States	N	States	N	States	Totals	%
Responses										
A (Yes)	4	12,17,51,49	11	5,11,12,23,26, 33,35,40,51,54, 22	2	9,15	0		17	27
B (No)	16	2,3,7,8,1.,18, 19,27,30,33,42, 46,47,48,52,54	18	1,4,8,13,18,16, 20,21,25,36,30, 32,31,39,44,46, 47,5	4	14,37,41,55	8	2,3,24,28,6,44, 45,50	46	73
C										
D										
E										
Totals	20		29		6		8		63	--
Omits	1		1		0				2	--

Table 2

Response Patterns to State Planning Category (Items 1-4)

Item # 1	Science N	Science States	Mathematics N	Mathematics States	Mathematics & Science N	Mathematics & Science States	Non-Mathematics & Science N	Non-Mathematics & Science States	Item Summary Totals	Item Summary %
Responses										
A	5	7,8,11,19,46	6	4,8,13,18,30,31	0		3	3,6,50	14	23
B	12	2,3,10,12,18,17,30,33,51,49,52,54	17	1,5,12,23,25,26,36,32,33,35,39,40,44,46,51,54,53	6	9,14,15,37,41,55	5	2,24,28,44,45	40	66
C	1	27	3	11,47,22	0		0		4	7
D	1	42	0		0		0		1	2
E	1	47	0		0		0		1	2
Totals	20		26		6		8		60	--
Omits	1		4		0		0		5	--

Table 2 (Continued)

Item # 2	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	0		0		0		0		0	0
B	1	12	0		0		0		1	2
C	1	33	0		0		0		1	2
D	0		2	13,25	0		0		2	3
E	19	2,3,7,8,10,11, 18,17,19,27,30, 42,46,47,48,51, 49,52,54	27	1,4,5,8,11,18, 16,17,20,21,23, 26,36,30,32,33, 31,35,39,40,44, 46,47,51,54,53, 22	6	9,14,15,41,55, 37	8	2,3,24,6,44, 45,50,28	60	93
Totals	21		29		6		8		64	--
Omits	0		1		0		0		1	--

Table 2 (Continued)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 3	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	0		1	5	0		0		1	2
B	0		2	33,47	0		1	24	3	5
C	4	38,30,33	8	18,16,23,26,39, 46,53,22	4	9,14,37,55	2	28,45	18	28
D	17	2,7,10,11,12,18, 17,19,27,42,46, 47,48,51,49,52, 54	18	1,4,8,11,12,13, 17,20,21,25,36, 30,32,31,35,44, 51,54	2	15,41	5	2,3,6,44,50	42	65
Totals	21		29		6		8		64	--
Omits	0		1		0		0		11	--

Table 2 (Continued)

Item									Item Summary	
	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Totals	%
# 4	N	States	N	States	N	States	N	States		
Responses *										
A	17	7,8,10,11,18,17,19,27,30,33,42,46,47,51,49,52,54	25	1,4,5,11,12,13,18,16,17,20,21,22,26,37,30,32,33,31,35,39,40,44,47,54,53	6	9,14,15,37,41,55	5	3,28,6,44,45	53	82
B	15	2,8,10,11,18,17,19,27,33,42,46,47,49,52,54	26	1,4,5,11,12,13,18,16,17,20,21,22,25,26,36,30,33,31,35,39,40,44,47,51,54,53	5	9,14,15,41,55	8	2,3,24,28,6,44,45,50	54	83
C	14	2,7,8,11,18,17,19,27,30,46,47,49,52,54	27	1,4,5,12,13,18,16,17,20,21,25,26,36,30,32,33,31,35,39,40,44,46,47,51,54,53,22	5	9,14,15,41,55	5	2,3,28,44,45	51	78
D	11	2,8,11,18,17,27,30,47,49,52,54	20	1,12,18,16,17,20,21,22,23,25,26,36,30,31,35,40,44,46,54,53	4	9,14,15,41	5	2,3,44,45,50	40	62
E	3	3,12,48	2	8,20	0		0		5	8
Totals										
Omits										

* More than one choice per respondent permitted

Table 3 Response Patterns to Budget Needs Category (Item 8)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
#8	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	1	11	0		0		0		1	2
B	0		1	54	0		0		1	2
C	2	17,27	7	5,13,17,20,21, 25,40	0		0		9	14
D	4	10,18,33,54	4	1,2,33,39	3	14,41,55	2	28,50	13	21
E	13	2,3,7,8,12,19,30 42,46,47,51,49, 52	17	8,18,16,24,23, 26,36,30,32,31, 35,44,46,47,51, 53,22	3	9,15,37	5	2,3,6,44,45	38	61
Totals	20		29		6		7		62	--
Omits	1		1		0		1		3	--

Table 4 Response Patterns to Curriculum Development for Pupils Category (Items 6, 10, 11)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 6	N	States	N	States	N	States	N	States	Totals	%
Responses *										
A	19	2,3,7,8,10,11, 12,18,17,27,30, 33,42,46,47,48, 49,52,54	30	47,51,54,53,22, 1,4,5,8,11,12, 13,18,16,17,20, 21,23,25,26,36, 30,32,33,31,35 39,40,44,46	6	9,14,15,37,41, 55	8	2,3,24,28,6,44, 45,50	63	97
B	14	7,8,10,12,18,17, 27,30,33,46,51, 49,52,54	26	1,4,5,11,12,13, 18,16,17,20,21, 23,25,51,54,53, 26,36,30,32,33, 35,40,44,46,47	4	9,15,41,55	4	3,6,44,45	48	74
C	13	7,8,10,12,18,17, 27,30,33,46,49, 52,54	24	1,4,11,12,13,18, 16,17,20,21,23, 25,53,26,36,30, 32,33,40,44,46, 47,51,54	4	9,15,41,55	4	3,6,44,45	45	69
D	13	7,8,10,11,12,18, 17,30,46,47,51, 49,52,54	24	1,4,5,11,12,13, 18,16,17,20,21, 23,25,53,26,30, 32,33,40,44,46, 47,51,54	3	15,41,55	5	3,6,44,45,50	45	69
E	13	7,8,10,12,18,17, 38,46,47,51,49, 52,54	17	1,11,12,13,23, 25,20,26,30,32, 33,40,44,46,47, 54,53	3	15,41,55	4	3,6,44,45	37	57
Totals										
Omits										

* More than one choice per respondent permitted

Table 4 (Continued)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 10	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	1	42	2	35,47	3	9,14,37	0		6	10
B	11	2,3,7,8,19,33, 46,51,49,52, 54	14	1,4,5,8,11,16,21, 25,26,36,31,44, 46,22,12,13,20, 54	2	15,55	6	2,3,28,6,44,45	33	53
C	4	12,18,17,27	4	12,13,20,54	1	41	1	24	10	16
D	4	11,30,47,48	8	18,23,30,32,39, 40,51,53	0		1	50	13	21
Totals	20		28		6		8		62	--
Omits	1		2		0		0		3	--

Table 4 (Continued)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 11	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	2	11,42	2	35,46	3	9,11,37	0		7	11
B	4	3,11,30,42	3	30,35,47	2	9,37	0		9	14
C	3	3,11,30	4	30,40,47,54	2	9,11	1	24	11	17
D	2	8,11	3	11,47,54	1	9	1	45	7	11
E	1	11	2	11,47	0		0		3	5
Totals									37	
Omits										

Table 5 Response Patterns to Inservice Training for Teachers Category (Items 9, 12, 13, 16)

Item # 9	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
Responses	N	States	N	States	N	States	N	States	Totals	%
A	3	8,10,30	2	1,26	4	9,14,37,55	0		9	14
B	11	2,3,7,12,19, 42,46,48,51,49, 54	9	4,8,11,20,21, 30,33,31,35	0		4	2,3,28,6	24	37
C	5	18,17,27,33, 52	10	13,16,25,36,32, 46,47,51,54,22	2	15,41	2	24,45	19	30
D	2	11,47	8	5,18,17,23,39, 40,44,53	0		2	44,50	12	19
Totals	21		29		6		8		64	--
Omits	0		1		0		0		1	--

Table 5 (Continued)

Item									Item Summary	
	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Totals	%
# 12	N	States	N	States	N	States	N	States		
Responses										
A	2	8,49	3	1,23,26	2	9,14	0		7	11
B	10	2,3,7,10,12,19, 42,46,48,51	12	4,5,8,11,17,20, 21,36,33,31,35, 46,	2	15,37	4	2,3,28,6	28	44
C	5	18,27,33,47,52	6	13,16,25,51,54, 22	1	41	2	24,45	14	22
D	4	11,17,30,54	8	18,30,32,39,40, 44,47,53	1	50	2	44,50	15	23
Totals	21		29		0		0		64	--
Omits	0		1		0		0		1	--

Table 5 (Continued)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 13	N	States	N	States	N	States	N	States	Totals	%
Responses *										
A	2	8,11	4	1,23,26,30	3	9,14,55	1	45	10	15
B	2	8,11	4	1,23,26,30	3	9,14,55	1	45	10	15
C	2	8,11	4	1,23,26,30	2	9,55	1	45	9	14
D	1	11	3	1,23,26	2	9,55	1	45	7	11
E	1	11	0		0	55	1		2	3
Totals										
Omits										

* More than one choice per respondent permitted

Table 5 (Continued)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 16	N	States	N	States	N	States	N	States	Totals	%
Responses *										
A	9	8,11,19,30,33, 47,48,49,52	14	11,16,23,25,26, 36,30,33,35,39, 40,46,51,54	0		3	24,45,50	26	40
B	11	2,3,8,11,19,27 30,33,48,49,52	11	11,18,16,21,25 36,30,39,40,46, 54	2	14,55	4	2,24,28,45	28	43
C	7	3,8,11,30,33, 48,52	7	18,25,36,30,40 46,54	1	14	3	24,28,45	18	28
D	5	8,11,17,30,42	10	5,8,11,18,23, 25,36,44,54,53	0		2	44,45	17	26
E	0		2	5,11	0		0		2	3
Totals										
Omits										

* More than one choice per respondent permitted

Table 6 Response Patterns to Exemplar Programs Category (Item 14)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 14	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	6	3,8,11,17,27,52	7	5,11,17,25,39, 44,53	3	14,41,55	2	24,44	18	29
B	3	2,49,54	4	4,13,36,31	1	9	3	2,3,6	11	18
C	12	7,10,18,19,30, 33,42,46,47,48, 51,12	17	1,8,18,16,20, 21,23,26,30,32, 33,35,40,46,47 54,22	1	15	3	28,45,50	33	53
D										
E										
Totals	21		28		5		8		62	--
Omits	0		2		1		0		3	--

Table 7 Response Patterns to Legislation Category (Item 5)

Item	Science		Mathematics		Mathematics & Science		Non-Mathematics & Science		Item Summary	
# 5	N	States	N	States	N	States	N	States	Totals	%
Responses										
A	0		0		1	37	0		1	2
B	0		3	1,25,26	1	14	0		4	6
C	5	2,7,12,33,54	5	5,23,33,54,53	0		2	2,24	12	20
D	14	3,8,10,11,18,17 19,27,30,42,46, 51,49,52	21	4,8,11,12,13,22, 18,21,20,17,46, 51,36,30,32,31, 35,39,40,44,47	3	9,15,55	6	3,28,6,44,45, 50	44	72
E		47,48				41				
Totals	19		29		5		8		61	--
Omits	2		1		1		0		4	--